

Neuroscience PHD

Research project for a PhD curriculum in Neuroscience

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Proposed Title of the research:

Investigating mechanisms of mental effort through computational modelling based on active inference

Keywords: mental effort, computational modelling, active inference, cognitive effort, volition

Research objectives:

- Develop computational models of effortful cognitive tasks (e.g., Stroop task.) within the active inference framework
- Collect behavioral data from human volunteers performing these tasks
- Recover hidden parameters associated with individual characteristics (e.g., personality traits, autonomic measures, etc.) related to the capacity to invest cognitive effort
- Establish the effect of different individual attitudes about the engagement of mental effort in shaping trajectories of performance and effort phenomenology over time

Proposed research activity

Aims: Clarifying the mechanisms of voluntary engagement of cognitive effort

Tools: Collection of behavioral, psychological and physiological data on human subjects (e.g., choices and reaction times, subjective experience ratings, heart rate), and computational modelling,

Expected outcomes: Identification of model parameters mechanistically related to the phenomenology of mental effort and task performance

Supporting research projects (and Department)

The project will be conducted in the Department of Biomedical, Metabolic, and Neural Sciences of the University of Modena & Reggio Emilia.

Possible external connections (research groups, companies, universities).

The project may involve collaborations with the neurology research group at the University of Modena and Reggio Emilia, to develop potential clinical application of the developed procedures, and with Dr. Thomas Parr (University of Oxford), a leading expert on active inference.
